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# Configuring TDM Services

NORTEL NETWORKS™

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# Contents

**Preface**

Before You Begin ..... xi
Text Conventions ..... xii
Acronyms ..... xiii
Hard-Copy Technical Manuals ..... xiv
How to Get Help ..... xiv

**Chapter 1**
**Understanding TDM**

Overview of TDM ..... 1-1
TDM Circuits ..... 1-1
Switched H.110 TDM Circuits ..... 1-2
CES H.110 TDM Circuits ..... 1-2
The Role of CES ..... 1-2
The TDM and ATM Connection ..... 1-3
Where to Go Next ..... 1-3

**Chapter 2**
**Customizing TDM**

Starting Configuration Tools ..... 2-2
Default TDM Configuration Parameters ..... 2-2
Making a Switched H.110 TDM Circuit Connection ..... 2-3
Making a CES H.110 TDM Circuit Connection ..... 2-6
Disabling or Reenabling Data over a TDM Circuit ..... 2-13
Setting the Clock Standard ..... 2-14
Choosing the Clock Source ..... 2-15
Partitioning the Timeslots ..... 2-16
Determining the Number of Timeslots ..... 2-18
Setting the Data Rate in the Timeslots ..... 2-19
Where to Go Next ..... 2-21

**Chapter 3**
**Video Conferencing**

Hardware Requirements ..... 3-1
Setting Up a Video Conference ..... 3-3
Where to Go Next ..... 3-3

**Appendix A**
**Site Manager Parameters**

Circuit TDM Resource Parameter ..... A-2
TDM Global Parameters ..... A-2
Dual Synchronous PMC Parameters ..... A-3

**Appendix B**
**BCC Show Commands**

show dsync config ..... B-2
show dsync stats ..... B-3
show switched-h110 config ..... B-3
show switched-h110 stats ..... B-4
show tdm h110 clock ..... B-5
show tdm partition ..... B-5

# Figures

Figure 1-1. Relationship Between ATM, TDM, and CES. .....1-3
Figure 3-1. Sample Video Conferencing Session Using TDM .....3-2

# Tables

Table 2-1. Default TDM Global Configuration Parameters .....2-2
Table 2-2. Default TDM Circuit Parameters .....2-2

# Preface

This guide describes time division multiplexing (TDM) and what you do to customize TDM services on a Nortel Networks™ router.

You can use the Bay Command Console (BCC™) or Site Manager to configure TDM on a router. In this guide, you will find instructions for using both the BCC and Site Manager.

## Before You Begin

Before using this guide, you must complete the following procedures. For a new router:

- Install the router (see the installation guide that came with your router).
- Connect the router to the network and create a pilot configuration file (see *Quick-Starting Routers*, *Configuring BayStack Remote Access*, or *Connecting ASN Routers to a Network)*.

Make sure that you are running the latest version of Nortel Networks BayRS™ and Site Manager software. For information about upgrading BayRS and Site Manager, see the upgrading guide for your version of BayRS.

# Text Conventions

This guide uses the following text conventions:

| | |
|---|---|
| angle brackets (< >) | Indicate that you choose the text to enter based on the description inside the brackets. Do not type the brackets when entering the command.<br>Example: If the command syntax is:<br>**ping** <*ip_address*>, you enter:<br>**ping 192.32.10.12** |
| **bold text** | Indicates command names and options and text that you need to enter.<br>Example: Enter **show ip** {**alerts** \| **routes**}.<br>Example: Use the **dinfo** command. |
| braces ({}) | Indicate required elements in syntax descriptions where there is more than one option. You must choose only one of the options. Do not type the braces when entering the command.<br>Example: If the command syntax is:<br>**show ip** {**alerts** \| **routes**}, you must enter either:<br>**show ip alerts** or **show ip routes**, but not both. |
| brackets ([ ]) | Indicate optional elements in syntax descriptions. Do not type the brackets when entering the command.<br>Example: If the command syntax is:<br>**show ip interfaces** [**-alerts**], you can enter either:<br>**show ip interfaces** or **show ip interfaces -alerts**. |
| ellipsis points (. . . ) | Indicate that you repeat the last element of the command as needed.<br>Example: If the command syntax is:<br>**ethernet/2/1** [<*parameter*> <*value*>] **. . .** , you enter **ethernet/2/1** and as many parameter-value pairs as needed. |

| | |
|---|---|
| *italic text* | Indicates file and directory names, new terms, book titles, and variables in command syntax descriptions. Where a variable is two or more words, the words are connected by an underscore.<br><br>Example: If the command syntax is:<br>**show at** <*valid_route*><br>*valid_route* is one variable and you substitute one value for it. |
| `screen text` | Indicates system output, for example, prompts and system messages.<br><br>Example: `Set Trap Monitor Filters` |
| separator ( > ) | Shows menu paths.<br><br>Example: Protocols > IP identifies the IP option on the Protocols menu. |
| vertical line ( \| ) | Separates choices for command keywords and arguments. Enter only one of the choices. Do not type the vertical line when entering the command.<br><br>Example: If the command syntax is:<br>**show ip** {**alerts** \| **routes**}, you enter either:<br>**show ip alerts** or **show ip routes**, but not both. |

## Acronyms

This guide uses the following acronyms:

| | |
|---|---|
| AAL 1 | ATM adaptation layer 1 |
| ATM | asynchronous transfer mode |
| CBR | constant bit rate |
| CES | circuit emulation services |
| LSB | least significant bit |
| MIB | management information base |
| MSB | most significant bit |

| | |
|---|---|
| PCI | peripheral component interconnect |
| PMC | PCI mezzanine card |
| PVC | permanent virtual circuit |
| TDM | time division multiplexing |
| WAN | wide area network |

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| Valbonne, France | 33-4-92-96-69-68 |
| Sydney, Australia | 61-2-9927-8800 |
| Tokyo, Japan | 81-3-5402-7041 |

# Chapter 1
# Understanding TDM

## Overview of TDM

Time division multiplexing (TDM) is a method in which a transmission device is multiplexed among a number of channels by allocating the device to the channels on the basis of timeslots. Timeslots are assigned so that each transmitting device gets its required share of the available bandwidth. Because of this time-bandwidth multiplexing technique, TDMs are protocol insensitive and can combine various protocols onto a single high-speed transmission link.

Some devices, such as voice and video systems, may require more timeslots to ensure that data arrives at the distant link-end without becoming distorted from slower data rates.

TDM technologies are available on the Passport 5430 to route TDM data between the dual synchronous PMC modules and the ATM (asynchronous transfer mode) super-serial daughterboard.

## TDM Circuits

You can establish two different types of TDM circuits:

- A switched H.110 TDM circuit
- A circuit emulation services (CES) H.110 TDM circuit

### Switched H.110 TDM Circuits

Switched H.110 TDM circuits allow you to establish a connection between two dual synchronous connectors. You use this type of circuit primarily for local connections.

### CES H.110 TDM Circuits

CES H.110 TDM circuits connect an ATM permanent virtual circuit (PVC) to an H.110-connected device. CES H.110 TDM circuits transmit TDM data over an ATM network using Circuit Emulation Services (CES). When you use this type of circuit, you must configure CES on an ATM PVC to emulate TDM functionality on that ATM PVC.

For information on how to configure CES, see *Configuring ATM Services.*

## The Role of CES

CES is a set of services that supports the emulation of TDM circuits over an ATM network. CES provides a constant bit rate (CBR) virtual circuit that performs just like a synchronous point-to-point private line.

When configuring CES to transfer TDM data, you must configure the ATM PVC to use the ATM adaptation layer 1 (AAL 1) encapsulation.

## The TDM and ATM Connection

You can configure TDM for local connections only, unless you also configure ATM. ATM provides the WAN connection that enables you to connect two remote locations (for example, to connect video conferencing equipment) using CES. See Figure 1-1.

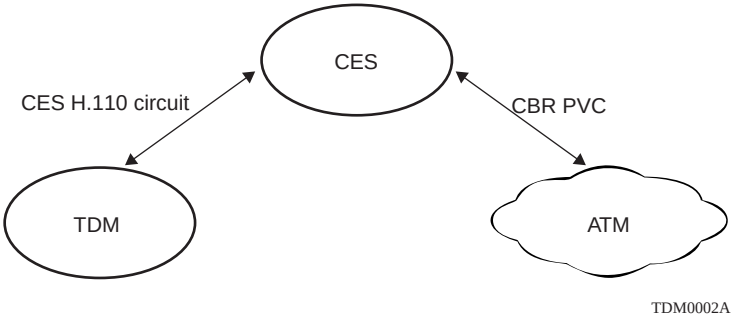


**Figure 1-1. Relationship Between ATM, TDM, and CES.**

## Where to Go Next

Use the following table to determine where to go next.

| If you want to | Go to |
|---|---|
| Change default settings for TDM parameters | Chapter 2 |
| Learn how to establish a point-to-point video conference using TDM | Chapter 3 |
| Obtain information about Site Manager parameters | Appendix A |
| Monitor TDM using the BCC show commands | Appendix B |

# Chapter 2
# Customizing TDM

When you start your router, TDM is already active and all TDM parameters use their default values. However, you cannot transfer TDM data until you connect both ends of the circuit. Once the circuit connection is complete, depending on the requirements of your network, you may want to change some of the default values. This chapter, which describes how to connect both ends of the TDM circuit and customize TDM details, includes the following information:


| Topic | Page |
|---|---|
| Starting Configuration Tools | 2-2 |
| Default TDM Configuration Parameters | 2-2 |
| Making a Switched H.110 TDM Circuit Connection | 2-3 |
| Making a CES H.110 TDM Circuit Connection | 2-6 |
| Disabling or Reenabling Data over a TDM Circuit | 2-13 |
| Setting the Clock Standard | 2-14 |
| Choosing the Clock Source | 2-15 |
| Partitioning the Timeslots | 2-16 |
| Determining the Number of Timeslots | 2-18 |
| Setting the Data Rate in the Timeslots | 2-19 |
| Where to Go Next | 2-21 |

# Starting Configuration Tools

Before you can view or change the default TDM configuration, refer to the following user guides for instructions on how to start and use the Nortel Networks configuration tool of your choice.

| Configuration Tool | User Guide |
|---|---|
| Bay Command Console (BCC) | *Using the Bay Command Console (BCC)* |
| Site Manager | *Configuring and Managing Routers with Site Manager* |

# Default TDM Configuration Parameters

The following table lists the default TDM global configuration parameters:

**Table 2-1. Default TDM Global Configuration Parameters**

| Parameter | Default Value |
|---|---|
| Clock standard | T1 |
| Clock source | Default clock |
| Timeslot partition | 32 channels |

The following table lists the default TDM circuit parameters.

**Table 2-2. Default TDM Circuit Parameters**

| Parameters | Default Value |
|---|---|
| Ability to send data over a TDM circuit | Enabled |
| Circuit type | Switched H.110 |
| Data rate within each timeslot | 64 Kb/s (full timeslot) |
| Number of timeslots | 1 |

# Making a Switched H.110 TDM Circuit Connection

By default, the router uses a switched H.110 circuit, which can connect two local dual synchronous connectors. Use this type of circuit to connect video conferencing equipment that connects to the same router.

**Note:** Once you connect the PORT connector to the other end of the circuit, you cannot modify the circuit type. To modify the circuit type, you must first unconnect the port.

### *Using the BCC*

To connect both ends of a switched H.110 TDM circuit, you must create entries for two dual synchronous connectors and then connect them.

1. **Create an entry for the first dual synchronous connector.**

   To create an entry for the first dual synchronous board, at the box prompt (for example, **box#**) enter:

   **dsync slot** *<slot_number>* **pci-slot** *<pci_number>* **module** *<mod_number>* **connector** *<connector_number>*

   *slot_number* is the slot number containing the dual synchronous module. The slot number for the dual synchronous module is always 1.

   *pci_number* is the number of the pci-slot containing the dual synchronous board.

   *module_number* is a convention used within the Passport 5430 chassis.

   *connector_number* is the connector associated with this interface.

   For example, to create an entry for the first dual synchronous connector located at slot 1, pci-slot 4, module 2, connector 2, enter:

   **box#** `dsync/1/4/2/2#` **dsync slot 1 pci-slot 4 module 2 connector 2**
   `dsync/1/4/2/2#`

2. **Create an entry for the second dual synchronous connector.**

   To create an entry for the second dual synchronous connector, navigate to the second dual synchronous board prompt (for example, **box#; dsync 1/4/2/2)** and enter:

   **dsync slot** *<slot_number>* **pci-slot** *<pci_number>* **module** *<mod_number>* **connector** *<connector_number>*

*slot_number* is the slot number containing the dual synchronous module. The slot number for the dual synchronous module is always 1.

*pci_number* is the number of the pci-slot containing the dual synchronous board.

*module_number* is a convention used within the Passport 5430 chassis.

*connector_number* is the connector associated with this interface.

For example, to create an entry for the second dual synchronous connector located at slot 1, pci-slot 4, module 1, connector 1, enter:

**box#** `dsync/1/4/2/2#` **dsync slot 1 pci-slot 4 module 1 connector 1**

3. **Connect the first dual synchronous connector to the second dual synchronous connector.**

   To connect the two dual synchronous connectors, navigate to the second dual synchronous connector prompt (for example**, box#; dsync 1/3/1/1**), and enter:

   **connect sslot** *<slot_number>* **spci-slot** *<pci_number>* **smodule** *<mod_number>* **sconnector** *<connector_number>*

   *slot_number* is the slot number containing the dual synchronous module. The slot number for the dual synchronous module is always 1.

   *pci_number* is the number of the pci-slot containing the dual synchronous board.

   *module_number* is a convention used within the Passport 5430 chassis.

   *connector_number* is the connector associated with this interface.

   For example, to connect the first dual synchronous connector located at slot 1, pci-slot 4, module 2, connector 2 to the second dual synchronous connector located at slot 1, pci-slot 4, module 1, connector 1, enter:

   **box#** `dsync/1/4/2/2#` **connect sslot 1 spci-slot 4 smodule 1 sconnector 1**

### *Using Site Manager*

To connect both ends of a switched H.110 TDM circuit, complete the following tasks:

| **Site Manager Procedure** | |
|---|---|
| **You do this** | **System responds** |
| 1. In the Configuration Manager window, click on the PORT connector. | The Edit Connector window opens. |
| 2. Click on **Edit TDM**. | The Edit Circuit TDM Parameters window opens. |
| 3. Set the **TDM Resource** parameter to Switched_H.110 for switched H.110 TDM circuit enabling local connections only. | |
| 4. Click on **OK**. | You return to the Edit Connector window. |
| 5. Click on **Config TDM** if you chose a switched H.110 circuit to connect two local dual synchronous connectors. | |
| 6. Click on **Connect**. | The Switched or CES H.110 Connector window opens. |
| 7. Click on **Connec**t. | The Switched or CES H.110 Circuit List window opens. |
| 8. Click on **Done**. | You return to the Configuration Manager window. |

# Making a CES H.110 TDM Circuit Connection

You can set the circuit type to CES H.110 if you want to connect a dual synchronous port with an ATM PVC on an ATM T1/E1 port so that you can emulate TDM functionality over ATM using CES. This type of circuit enables you to connect video conferencing equipment in two different remote locations.

**Note:** Once you connect the PORT connector to the other end of the circuit, you cannot modify the circuit type. To modify the circuit type, you must first disconnect the port.

To connect both ends of a CES H.110 TDM circuit, complete the following steps:

- Create an entry for the dual synchronous connector.
- Create an entry for the ATM connector.
- Define an ATM PVC service record that uses null encapsulation.
- Create an ATM PVC that uses AAL 1 encapsulation and uses the CBR service category.
- Start CES to connect the dual synchronous connector to the ATM PVC.

### *Using the BCC*

1. **Create an entry for the dual synchronous connector.**

   To make a CES H.110 TDM circuit connection, first navigate to the box prompt (for example, **box#**) and enter:

   **dsync slot** *<slot_number>* **pci-slot** *<pci_number>* **module** *<mod_number>* **connector** *<connector_number>*

   *slot_number* is the slot number containing the dual synchronous module. The slot number for the dual synchronous module is always 1.

   *pci_number* is the number of the pci-slot containing the dual synchronous board.

   *module_number* is a convention used within the Passport 5430 chassis.

   *connector_number* is the connector associated with this interface.

For example, to create an entry for the first dual synchronous connector located at slot 1, pci-slot 4, module 2, connector 2, enter:

```
box# dsync slot 1 pci-slot 4 module 2 connector 2
dsync/1/4/2/2#
```

2. **Create an entry for an ATM T1/E1 connector.**

   Next, navigate to the box prompt (for example, **box#**) to add ATM to the configuration so that you can connect an ATM PVC to the dual synchronous connector, and enter:

   **atm slot** *<slot_number>* **pci-slot** *<pci_slot_number>* **module** *<module_number>* **connector** *<connector_number>* **mode** *<mode>*

   To add ATM to the configuration, navigate to the top-level prompt and enter:

   **atm slot** *<slot_number>* **pci-slot** *<pci_slot_number>* **module** *<module_number>* **connector** *<connector_number>*

   *slot_number* is the number of the chassis slot containing the link module.

   *pci_slot_number* is the pci-slot number of the ATM-E1/ATM-T1 line. The pci slot number for the ATM router is always 1.

   *module_number* is a convention used within the Passport 5430 or System 5000 chassis. You need only enter a module number when configuring an ATM router in the Passport 5430 or System 5000 chassis (that is, the Model 5782 Centillion Multiprotocol Engine). The module number for the ATM router is always 1.

   *connector_number* is the number of a connector on the link module

   *mode* is the frequency mode you want to use, either T1 or E1.

   For example, to create an ATM entry at slot 1, pci-slot 1, module 2, connector 1, using the T1 mode, enter:

   ```
   box# atm slot 1 pci-slot 1 module 2 connector 1 mode t1
   atm/1/1/2/1#
   ```

3. **Define an ATM PVC service record.**

   To define an ATM PVC service record, navigate to the ATM interface prompt (for example, **box#;atm/1/1/2/1**) and enter:

   **pvc-service** *<service_name>* **encapsulation** *<encapsulation_type>*

   *service_name* is a unique text string that you assign to the service record.

*encapsulation_type* is the data encapsulation type that you want the PVC service record to use.

When configuring a CES H.110 TDM circuit, you must define an ATM service record that uses null encapsulation.

For example, the following command defines a PVC service record with the name “ces1422” and that uses null encapsulation on ATM slot 1, pci-slot 1, module 2, connector 1:

```
atm/5/1# pvc-service service-name ces1422 encapsulation null
pvc-service/ces1422#
```

4. **Add an ATM PVC to the PVC service record.**

   To add a PVC to a PVC service record, navigate to the ATM PVC service record prompt (for example, **box#;atm/1/1/2/1;pvc-service/ces1422**), and enter:

   **pvc vpi** *<vpi_number>* **vci** *<vci_number>*

   *vpi_number* identifies the virtual path of the PVC. The header can contain a maximum of 8 VPI bits for a UNI connection. This bit range allows for path identifiers from 0 to 255.

   *vci_number* identifies the virtual channel of the PVC. The header can contain a maximum of 16 VCI bits. This bit range allows for channel identifiers from 32 to 65535.

**Note:** Following the recommendation of the ATM Forum, virtual channel identifiers from 0 to 31 are reserved for signaling and added functionality.

   For example, the following command adds PVC 32/33 to the configuration on PVC service record ces1422:

```
pvc-service/ces1422# pvc vpi 32 vci 33
pvc/32/33#
```

5. **Set the AAL encapsulation type of the ATM PVC to AAL 1.**

   To set the AAL encapsulation type to AAL 1, navigate to the ATM PVC prompt (for example, **box#;atm/1/1/2/1;pvc-service/ces1422;pvc/32/33**), and enter:

   **aal-type aal1**

6. **Set the service category of the ATM PVC to constant bit rate (CBR).**

To set the service category to CBR, navigate to the ATM PVC prompt (for example, **box#;atm/1/1/2/1;pvc-service/ces1422;pvc/32/33**), and enter:

**service-category cbr**

7. **Connect a dual synchronous connector to an ATM PVC.**

   To connect the dual synchronous connector to the ATM PVC, navigate to the ATM PVC prompt (for example, **box#;atm/1/1/2/1;pvc-service/ces1422;pvc/0/130**) and enter:

   **ces sslot** *<slot_number>* **spci-slot** *<pci_number>* **smodule** *<mod_number>* **sconnector** *<conn_number>*

   **connect sslot** *<slot_number>* **spci-slot** *<pci_number>* **smodule** *<mod_number>* **sconnector** *<connector_number>*

   *slot_number* is the slot number containing the dual synchronous module. The slot number for the dual synchronous module is always 1.

   *pci_number* is the number of the pci-slot containing the dual synchronous board.

   *smodule_number* is a convention used within the Passport 5430 chassis.

   *connector_number* is the connector associated with this interface.

   For example, to connect an ATM PVC, located at slot 1, pci-slot 1, module 2, connector 1 with a VCI/VPI pair of 32/33, to the dual synchronous connector located at slot 1, pci-slot 4, module 2, connector 2, enter the following command:

   pvc/1/1/2/1/32/33# **ces 1/4/2/2**

### *Using Site Manager*

To make a CES H.110 TDM circuit connection, complete the following tasks:

1. **Configure a dual synchronous board.**

| **Site Manager Procedure** | |
|---|---|
| **You do this** | **System responds** |
| 1. In the Site Manager window, click on **Configuration Manager**. | The Open Configuration File window opens. |
| 2. Specify a configuration file name and click on **Save**. | The Select Router Model window opens. |

| Site Manager Procedure *(continued)* | |
|---|---|
| **You do this** | **System responds** |
| 3. Click on **Passport 5430** and then click on **Confirm**. | The Configuration manager window opens. |
| 4. Click on **Empty Module**. | The Module List window opens. |
| 5. Select **Dual Sync** and click on **OK**. | You return to the Configuration Manager window. Two PORT connectors on the dual synchronous board are now available. |
| 6. Click on one of the PORT connectors. | The Add Circuit window opens. |
| 7. Click on **OK**. | You return to the Configuration Manager window. |

## 2. Establish a TDM CES H.110 circuit.

| Site Manager Procedure | |
|---|---|
| **You do this** | **System responds** |
| 1. In the Configuration Manager window, click on the PORT connector. | The Edit Connector window opens. |
| 2. Click on **Edit TDM**. | The Edit Circuit TDM Parameters window opens. |
| 3. Set the **TDM Resource** parameter to CES_H110. | |
| 4. Click on **OK**. | You return to the Edit Connector window. |
| 5. Click on **Done**. | You return to the Configuration Manager window. |

**3. Establish an ATM PVC having AAL 1 encapsulation and CBR service category.**

When you establish an ATM PVC, be sure to set the AAL Type to 1 and the service category to CBR.

| Site Manager Procedure | |
|---|---|
| **You do this** | **System responds** |
| 1. In the Configuration Manager window, click on **Empty ATM T1/E1 Module**. | The Module List window opens. |
| 2. Select ATM T1/E1 and click on **OK**. | You return to the Configuration Manager window. An ATM connector is now available. |
| 3. Click on the ATM connector. | The Add Circuit window opens. |
| 4. Click on **OK**. | The ATM Configuration window opens. |
| 5. Click on **ATM**. | The Edit ATM Connector window opens. |
| 6. Click on **Service Attributes**. | The ATM Service Records List window opens. |
| 7. Click on **PVC**. | The ATM Service Records parameters window opens. |
| 8. Accept the default values and click on **OK**. | The Select Protocols window opens. |
| 9. Add one or more protocols (such as IP) and configure those protocols. | The ATM Virtual Channel Link window opens. |
| 10. Click on **Add**. | The ATM Virtual Channel Link Parameters window opens. |
| 11. Enter the VPI/VCI Pair. For information on how to configure these parameters, see *Configuring ATM Services*. | |
| 12. Click on **OK**. | You return to the ATM Virtual Channel Link window. |
| 13. Highlight the virtual channel and configure the following parameters:<br>• AAL Type parameter to **AAL 1 encapsulation**.<br>• Service Category to **CBR**. | |
| 14. Click on **Apply**. | |

*(continued)*

| Site Manager Procedure *(continued)* | |
|---|---|
| **You do this** | **System responds** |
| 15. Click on **Done**. | You return to the ATM Service Records List window. |
| 16. Click on **Done**. | You return to the Edit ATM Connector window. |
| 17. Click on **Done**. | You return to the ATM Configuration window. |
| 18. Click on **Done**. | You return to the Configuration Manager window. |

### 4. Configure CES.

| Site Manager Procedure | |
|---|---|
| **You do this** | **System responds** |
| 1. In the Configuration Manager window, click on the PORT connector. | The Edit Connector window opens. |
| 2. Click on **Config CES**. | The CES H.110 Circuit window opens. |
| 3. Click on **Connect**. | The CES H.110 Circuit List window opens. |
| 4. Highlight the CES H.110 circuit and click on **OK**. | You return to the Edit Connector window. |
| 5. Click on **Done**. | You return to the Configuration Manager window. |

# Disabling or Reenabling Data over a TDM Circuit

By default, when you create a TDM circuit, data traffic over that circuit is enabled. You can disable and reenable the traffic over a TDM circuit. Changing the state of the traffic over a TDM circuit is useful, for example, when you want to hang up (disable) a conference call.

### *Using the BCC*

To disable traffic over a TDM circuit, navigate to the dual synchronous connector prompt (for example, **box#; dsync 3/1/1**) and enter:

**state disabled**

To enable traffic over a TDM circuit, navigate to the dual synchronous connector prompt (for example, **box#; dsync 3/1/1**) and enter:

**state enabled**

### *Using Site Manager*

To disable or reenable traffic over a TDM circuit, complete the following tasks:

| **Site Manager Procedure** | |
|---|---|
| **You do this** | **System responds** |
| 1. In the Configuration Manager window, click on the PORT connector. | The Edit Connector window opens. |
| 2. Click on **Edit Line**. | The Edit DSYNC PMC Parameters window opens. |
| 3. Set the **Enable** parameter. Click on **Help** or see the parameter description on page A-3. | |
| 4. Click on **OK**. | You return to the Edit Connector window. |
| 5. Click on **Done**. | You return to the Configuration Manager window. |

# Setting the Clock Standard

Before configuring a TDM circuit, you can set the TDM clock standard to use the default clock or to use either the T1 or E1 frequency. By default, the TDM clock standard is set to the standard that will be used for TDM. The TDM clock standard affects all TDM circuits (CES and switched.)

**Note:** A change to the TDM clock standard takes effect only after you reboot the router with the new configuration file. Any change to the timeslot partition also requires that you save your configuration and reboot. To save time, you may want to be sure you have configured both the TDM clock standard and the timeslot partition before you save your configuration and reboot.

### *Using the BCC*

To set the clock standard, navigate to the TDM prompt (for example, **box#; tdm**) and enter:

**clock-standard** *<frequency>*

*frequency* specifies whether you are using the T1 or E1 clock frequency for the clock standard.

For example, the following command chooses the E1 frequency as the clock standard:

`tdm#` **clock-standard e1**

### *Using Site Manager*

To set the TDM clock standard, complete the following tasks:

| Site Manager Procedure | |
|---|---|
| **You do this** | **System responds** |
| 1. In the Configuration Manager window, click **Platform >TDM > Clock Connectors**. | The TDM Clock Parameters window opens. |
| 2. Highlight the clock that you want to set and choose from the oscillator or ATM clock options. Otherwise, click on **Select All** to change all clock settings or **Deselect All** to revert all clocks to the default setting. | |
| 3. Click on **OK**. | You return to the Configuration Manager window. |

## Choosing the Clock Source

TDM initially uses the default clock. You can use either the default clock or the clock from a configured connector (such as the ATM T1/E1, or T1/E1.)

### *Using the BCC*

To set the clock source, navigate to the TDM prompt (for example, **box#;atm/1/1/2/1; tdm**) and enter:

**clock***x <source>*

*x* is the number that identifies clocks 1 through 8.

*source* is the clock source you want to use.

For example, to set the first clock source to ATM, where the ATM connector is 1201, enter:

```
box# atm 1/1/2/1 mode t1
atm/1/1/2/1# tdm
tdm# clock1 1201
```

### *Using Site Manager*

To choose a clock source, enter the following commands:

| Site Manager Procedure | |
|---|---|
| **You do this** | **System responds** |
| 1. In the Configuration Manager window, click **Platform >TDM > Clock Connectors**. | The TDM Clock Parameters window opens. |
| 2. Highlight the clock number and select the clock source from the pull down menu. | |
| 3. Click on **OK**. | You return to the Configuration Manager window. |

## Partitioning the Timeslots

Partitioning the timeslots determines the maximum number of 64 Kb/s and 56 Kb/s timeslots for all circuits. When you partition the timeslots, you must specify an even number of channels to reserve for the 64 Kb/s virtual trunk. The remainder of the channels will be reserved for the 56 Kb/s trunk.

If you add more CES TDM circuits and run out of 64 Kb/s timeslot space, then you need to change the partition to allocate more 64 Kb/s timeslot spaces (which leaves you fewer 56 Kb/s timeslot spaces). Use the BCC **show tdm partition** command to determine how many 56 Kb/s channels are available.

### *Using the BCC*

**Note:** A change to the timeslot partition takes effect only after you reboot the router with the new configuration file. Any change to the TDM clock standard also requires that you save your configuration and reboot. To save time, you may want to be sure you've configured both the TDM clock standard and the timeslot partition before you save your configuration and reboot.

To partition the timeslots, navigate to the TDM prompt (for example, **box#; tdm**) and enter:

`tdm#` **timeslot-partition** *<integer>*

*integer* is the number of channels per virtual trunk.

For example, the following command allocates 30 64 Kb/s timeslots with the remainder reserved for 56 Kb/s timeslots:

`tdm#` **timeslot-partition 30**

### *Using Site Manager*

To partition the timeslots, complete the following tasks:

| **Site Manager Procedure** | |
|---|---|
| **You do this** | **System responds** |
| 1. In the Configuration Manager window, click **Platform >TDM > Global**. | The Edit TDM Global Parameters window opens. |
| 2. Set the **Timeslot Partition** parameter. Click on **Help** or see the parameter description on page A-2. | |
| 3. Click on **OK**. | You return to the Configuration Manager window. |

# Determining the Number of Timeslots

The number of timeslots that are available depends on your setting for the data rate. If you choose to send 64 Kb/s data, you can have more than 1 timeslot available to transmit data. If you choose to send 56 Kb/s data, then you can have only 1 timeslot available for data transmission.

### *Using the BCC*

To allocate the number of timeslots for a switched H.110 circuit, navigate to the connect prompt (for example, **box#; dsync 1/4/2/2; dsync 1/4/2/2; connect 1/4/2/2**) and enter:

For example, the following command allocates the number of timeslots assigned to the switched H.110 circuit.

**timeslots** *<integer>*

*integer* is the number of timeslots that you want to use.

For example, the following command allocates three timeslots.

`connect/2/1/1/1/2/1#` **timeslots 3**

To allocate the number of timeslots for a CES H.110 circuit, navigate to the CES prompt (for example, **box#; dsync 1/4/2/2;atm 1/1/2/1 mode t1;pvc-service ces1422;pvc 1/1/2/1/32/33;ces 1/4/2/2**) and enter:

**timeslots** *<integer>*

*integer* is the number of timeslots that you want to use.

For example, the following command allocates three timeslots.

`connect/2/1/1/1/2/1#` **timeslots 3**

### *Using Site Manager*

To allocate the number of timeslots, complete the following tasks:

| Site Manager Procedure | |
|---|---|
| **You do this** | **System responds** |
| 1. In the Configuration Manager window, click **Platform >TDM > Connections**. | The TDM Connections window opens. |
| 2. Set the **Number of Timeslots** parameter. Click on **Help** or see the parameter description on page A-3. | |
| 3. Click on **OK**. | You return to the Configuration Manager window. |

## Setting the Data Rate in the Timeslots

You can determine the rate at which data can travel within each and every timeslot in the circuit, as follows:

- Select 64K for a full timeslot. When you select 64K, the data rate is 64 Kb/s times the number of timeslots for the 64 Kb/s timeslots.
- Select 56K MSB to set the most significant bit (that is, the first bit on the wire) to 1 and have data carried on the next 7 bits. If you select 56K, you can have only one timeslot and the data rate is 56 Kb/s.
- Select 56K LSB to carry data on the first 7 bits. Set the least significant bit (that is, the last bit) to 1. If you select 56K, you can have only one timeslot and the data rate is 56 Kb/s.

### *Using the BCC*

To set the data rate for a switched H.110 circuit, navigate to the connect prompt (for example, **box#; dsync 1/4/2/2; dsync 1/4/2/2; connect 1/4/2/2)** and enter:

**timeslot-subrate** *<value>*

*value* is the rate at which data travels in the timeslots.

For example, the following command allocates a full 64 Kb/s for data within each timeslot on the switched H.110 circuit.

`connect/2/1/1/1/2/1#` **timeslot-subrate 64k**

To set the data rate for a CES H.110 circuit, navigate to the CES prompt (for example, **box#; dsync 1/4/2/2;atm 1/1/2/1 mode t1;pvc-service ces1422;pvc 1/1/2/1/32/33;ces 1/4/2/2**) and enter:

**timeslot-subrate** *<value>*

*integer* is the rate at which data travels in the timeslots.

For example, the following command allocates a full 64 Kb/s for data within each timeslot on the CES H.110 circuit.

`ces/32/33/1/4/2/2#` **timeslot-subrate 64k**

### *Using Site Manager*

To determine the data rate for each timeslot in the partition, complete the following tasks:

| **Site Manager Procedure** | |
|---|---|
| **You do this** | **System responds** |
| 1. In the Configuration Manager window, click **Platform >TDM > Connections**. | The TDM Connections window opens. |
| 2. Set the **Per-Timeslot Subrate** parameter. Click on **Help** or see the parameter description on page A-3. | |
| 3. Click on **OK**. | You return to the Configuration Manager window. |

# Where to Go Next

Use the following table to determine where to go next.

| If you want to | Go to |
|---|---|
| Learn about TDM. | Chapter 1 |
| Learn how to establish a point-to-point video conferencing session using TDM. | Chapter 3 |
| Obtain information about Site Manager parameters. | Appendix A |
| Monitor TDM using the BCC show commands. | Appendix B |

# Chapter 3
# Video Conferencing

This chapter, which describes how to set up a point-to-point video conference, includes the following information:


| Topic | Page |
|---|---|
| Hardware Requirements | 3-1 |
| Setting Up a Video Conference | 3-3 |
| Where to Go Next | 3-3 |


## Hardware Requirements

A point-to-point video conference requires that you have video conferencing equipment at two or more remote locations. As shown in Figure 3-1, this equipment consists of:

- A Passport 5430 with a dual synchronous module
- Cameras, televisions, etc., supplied by a vendor such as PictureTel, Vtel, or Vcon
- A V.35 interface
- A line speed capable of 56, 64, 128, 192, 256, 320, and 384 Kb/s

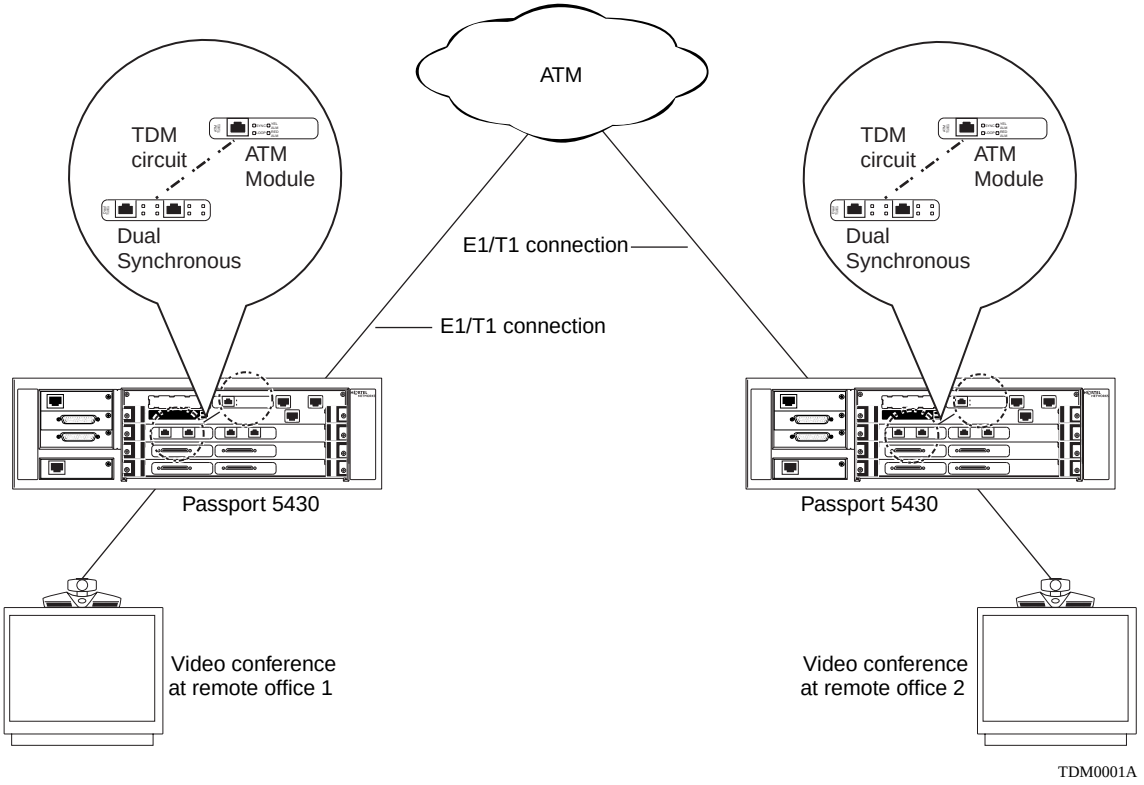


**Figure 3-1. Sample Video Conferencing Session Using TDM**

## Setting Up a Video Conference

To set up a video conference, first disable dialing and ensure that all equipment supports a direct connection. Next, follow the instructions for how to make a CES H.110 TDM connection in “Making a CES H.110 TDM Circuit Connection” on page 2-6.

## Where to Go Next

Use the following table to determine where to go next.

| If you want to | Go to |
|---|---|
| Learn about TDM. | Chapter 1 |
| Change default settings for TDM parameters. | Chapter 2 |
| Obtain information about Site Manager parameters. | Appendix A |
| Monitor TDM using the BCC show commands. | Appendix B |

# Appendix A
# Site Manager Parameters

After you enable a TDM circuit, you can use Site Manager parameters to edit TDM parameters. Many TDM parameters are interdependent; how you edit some parameters depends on how you set others.

This appendix contains the Site Manager parameter descriptions for TDM services. You can display the same information using Site Manager online Help.

This appendix contains the following information:


| Topic | Page |
|---|---|
| Circuit TDM Resource Parameter | A-2 |
| TDM Global Parameters | A-2 |
| Dual Synchronous PMC Parameters | A-3 |

## Circuit TDM Resource Parameter

The circuit TDM resource parameter determines whether the TDM circuit can make a local or remote connection.

**Parameter:** **TDM Resource**

Path: Configuration Manager > **Connector > Edit TDM**

Default: Switched_H110

Options: Switched_H110 | CES_H110

Function: Identifies the TDM circuit used by this resource.

Instructions: Select CES_H110 to emulate TDM functionality over an ATM circuit. Select Switched_H110 to establish a local connection between two dual synchronous ports. Use switched H.110 circuits mainly for testing purposes.

MIB Object ID: 1.3.6.1.4.1.18.3.3.2.3.1.10

## TDM Global Parameters

The TDM global parameters determine the box-wide behavior of the TDM circuit.

**Parameter:** **Clock Standard**

Path: Configuration Manager > Platform > **TDM > Global**

Default: T1

Options: T1 | E1

Function: Specifies the frequency (T1 or E1) of the H.110 clock sources.

Instructions: Select T1 or E1.

MIB Object ID: 1.3.6.1.4.1.18.3.3.2.9.3.3.1.3

**Parameter:** **Timeslot Partition**

Path: Configuration Manager > Platform > **TDM > Global**

Default: 32

Options: 0 through 64

Function: Specifies the number of channels to reserve for the 64 Kb/s virtual trunk. The remainder of the channels will be reserved for the 56 Kb/s trunk. Your setting for timeslot partition must be an even number.

Instructions: Select an even number between 0 and 64.

MIB Object ID: 1.3.6.1.4.1.18.3.3.2.9.3.4.1.3

## Dual Synchronous PMC Parameters

The dual synchronous PMC parameters determine the behavior of the TDM circuit on an individual timeslot basis.

**Parameter: Enable**

Path: Configuration Manager > **Connector > Edit Line**
Default: Enable
Options: Enable | Disable
Function: Enables traffic over a TDM circuit.
Instructions: Select Enable to enable traffic over a TDM circuit. Select Disable to disable traffic over a TDM circuit.
MIB Object ID: 1.3.6.1.4.1.18.3.3.2.9.3.5.1.2

**Parameter: Per-Timeslot Subrate**

Path: Configuration Manager > **Connector > Edit Line**
Default: Subrate_64K
Options: Subrate_64K | Subrate_56KMSB | Subrate_64KLSB
Function: Specifies data rate for each timeslot within a TDM circuit.
Instructions: Accept the default, 64K, for a full timeslot. Select 56KMSB to send 56 Kb/s data and set the first bit on the wire and have data carried on the next 7 bits. Select 56KLSB to send 56 Kb/s data and carry data on the first 7 bits and set the last bit to 1.
MIB Object ID: 1.3.6.1.4.1.18.3.3.2.9.3.5.1.7

**Parameter: Number of Timeslots**

Path: Configuration Manager > **Connector > Edit Line**
Default: 1
Options: 1 through 32
Function: Number of TDM circuit timeslots occupied by this interface. Since TDM circuits are full-duplex, setting this attribute to *N* will allocate *N* transmit timeslots and *N* receive timeslots.
Instructions: Accept the default or select a value from 1 to 32.
MIB Object ID: 1.3.6.1.4.1.18.3.3.2.9.3.5.1.8

# Appendix B
# BCC Show Commands

This appendix describes how to use the BCC **show** commands to obtain TDM and DSYNC statistical data from the management information base (MIB). The type and amount of data displayed depend on the specific TDM and DSYNC settings that you want to view. This appendix includes descriptions of the following **show** commands:


| Command | Page |
|---|---|
| show dsync config | B-2 |
| show dsync stats | B-3 |
| show switched-h110 config | B-3 |
| show switched-h110 stats | B-4 |
| show tdm h110 clock | B-5 |
| show tdm partition | B-5 |

# show dsync config

The **show dsync config** command displays all dual synchronous port information.

This command allows for the following command filter (flag) and filter arguments:

| | |
|---|---|
| **-circuit** *<circuit_name>* | Displays information about the specified dual synchronous circuit. |

The output includes the following information:

| | |
|---|---|
| Slot/Pci_Slot/Module/ Connector | The slot/Pci_Slot/module/connector location of the DualSync interface. |
| Circuit Name | Circuit name assigned to the interface. |
| Oper. Stats | The current state of this interface. |
| Timeslot Subrate | The data rate within each and every timeslot within this TDM circuit. |
| Timeslot Number | Number of timeslots occupied by this H.110 TDM circuit. |
| Total Up Time | The total time the interface has been in its current operational state (UP state) since boot. |
| TDM Resource | The type of the TDM resource. |
| TDM Connection | The indication of whether this TDM circuit is currently in use. |

# show dsync stats

The **show dsync stats** command displays all status of all dual synchronous ports.

This command allows for the following command filter (flag) and filter arguments:

| | |
|---|---|
| **-circuit** *<circuit_name>* | Displays information about the specified dual synchronous circuit. |

The output includes the following information:

| | |
|---|---|
| Slot/Pci_Slot/Module/ Connector | The slot/Pci_Slot/module/connector location of the DualSync interface. |
| Circuit Name | Circuit name assigned to the interface. |
| Oper. Stats | The current state of this interface. |
| Receive Bytes | Number of octets received. |
| Transmit Bytes | Number of octets transmitted. |
| Cable Type | The type of the cable attached to the TDM interface port. |
| EIA Status | The state of the EIA signals at the router interface. |

# show switched-h110 config

The **show switched-h110 config** command displays all TDM dual synchronous switched connection information.

The output includes the following information:

| | |
|---|---|
| DualSync Slot/Pci_Slot/ Module/Connector | The first DualSync Slot/Pci_Slot/Module/Connector location of the TDM switched connection. |
| DualSync Slot/Pci_Slot/ Module/Connector | The second DualSync Slot/Pci_Slot/Module/Connector location of the TDM switched connection. |
| Circuit Name | Circuit name assigned to the interface. |
| Timeslot Subrate | The data rate within each and every timeslot within this TDM circuit. |
| Timeslot Partition | Number of timeslots occupied by this H.110 TDM circuit. |
| Oper. State | State of the TDM switched connection. |

# show switched-h110 stats

The **show switched-h110 stats** command displays all TDM dual synchronous switched connection status information.

The output includes the following information:

| | |
|---|---|
| Conn | Connector number of the interface. |
| Slot/Pci_Slot/Module/ Connector | The DualSync Slot/Pci_Slot/Module/Connector location of the TDM switched connection. |
| Circuit Name | Circuit name assigned to the interface. |
| Timeslot Subrate | The data rate within each and every timeslot within this TDM circuit. |
| Timeslot Partition | The number of timeslots occupied by this H.110 TDM circuit. |
| Oper. State | State of the TDM line: Up, Down, Init (initializing), Disabled, or Absent. |
| Receive Bytes | Number of octets received. |
| Transmit Bytes | Number of octets transmitted. |

# show tdm h110 clock

The **show tdm h110 clock** command displays all H.110 clock source connector information for the TDM manager on the Passport 5430.

The output includes the following information:

| | |
|---|---|
| Clock Standard | The frequency (T1 or E1) of the H.110 clock sources. |
| Current Clock State | The state of the current clock source. |
| Current Clock Source | The currently active H.110 clock source |
| Clk 1 | The GAME Instance Id Connector of H.110 clock source 1. |
| Clk 2 | The GAME Instance Id Connector of H.110 clock source 2. |
| Clk 3 | The GAME Instance Id Connector of H.110 clock source 3. |
| Clk 4 | The GAME Instance Id Connector of H.110 clock source 4. |
| Clk 5 | The GAME Instance Id Connector of H.110 clock source 5. |
| Clk 6 | The GAME Instance Id Connector of H.110 clock source 6. |
| Clk 7 | The GAME Instance Id Connector of H.110 clock source 7. |
| Clk 8 | The GAME Instance Id Connector of H.110 clock source 8. |
| Clk 9 | The GAME Instance Id Connector of H.110 clock source 9. |

# show tdm partition

The **show tdm partition** command displays the timeslot partition information for the TDM manager on the Passport 5430.

The output includes the following information:

| | |
|---|---|
| Timeslot Partition 64K Channel | Number of channels to reserve for the 64 Kb/s virtual trunk. |
| Timeslot Partition 56K Channel | Number of channels reserved for the 56 Kb/s virtual trunk. |

# Index


## A

acronyms, xiii

ATM
- configuration tools, 2-2
- interface, customizing, 2-1

## B

BCC show commands, B-1

## C

CBR, 1-2

CES, 1-2, 2-6

CES H.110 circuit, 1-1, 2-6

circuit
- CES H.110, 1-1
- switched H.110, 1-1

Circuit Emulation Services (CES), 1-2

clock source, 2-15

clock standard, 2-14

Clock Standard Parameter, A-2

constant bit rate (CBR), 1-2

conventions, text, xii

customer support, xiv

## D

data rate, 2-19

default configuration, 2-2

disabling TDM traffic, 2-13

dual synchronous connectors, 1-2, 2-3

## E

emulating TDM functionality over ATM, 1-2

Enable parameter, A-3

enabling TDM traffic, 2-13

## N

number of timeslots, 2-18

Number of Timeslots parameter, A-3

## P

parameters
- Clock Standard, A-2
- Enable, A-3
- Number of Timeslots, A-3
- Per-Timeslot Subrate, A-3
- TDM Resource, A-2
- Timeslot Partition, A-2

partitioning timeslots, 2-16

Passport 5430, 1-1

permanent virtual circuit, 1-2

Per-Timeslot Subrate parameter, A-3

PMC modules, 1-1

product support, xiv

protocols, 1-1

publications
- hard copy, xiv

PVC, 1-2

PVCs, defining service records for, 2-7

## S

show commands, B-1
Site Manager parameters, A-1
super-serial daughterboard, 1-1
support, Nortel Networks, xiv
switched H.110 circuit, 1-1, 2-3

## T

TDM configuration, default, 2-2
TDM Resource parameter, A-2
TDM traffic
  disabling, 2-13
  enabling, 2-13
TDM, defined, 1-1
technical publications, xiv
technical support, xiv
text conventions, xii
Time division multiplexing, defined, 1-1
time-bandwidth multiplexing, 1-1
Timeslot Partition parameter, A-2
timeslot subrate, 2-20
timeslots, 1-1
  partitions, 2-16

## V

video conferencing
  local, 2-3
  remote locations, 2-6
voice and video systems, 1-1